

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process)

2SA970

Low Noise Audio Amplifier Applications

- Low noise :NF = 3dB (typ.) $R_G = 100\ \Omega$, $V_{CE} = -6\text{ V}$, $I_C = -100\ \mu\text{A}$,
 $f = 1\text{ kHz}$
: NF = 0.5dB (typ.) $R_G = 1\text{ k}\Omega$, $V_{CE} = -6\text{ V}$, $I_C = -100\ \mu\text{A}$,
 $f = 1\text{ kHz}$
- High DC current gain: $h_{FE} = 200\sim 700$
- High breakdown voltage: $V_{CEO} = -120\text{ V}$
- Low pulse noise. Low $1/f$ noise

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	-120	V
Collector-emitter voltage	V_{CEO}	-120	V
Emitter-base voltage	V_{EBO}	-5	V
Collector current	I_C	-100	mA
Base current	I_B	-20	mA
Collector power dissipation	P_C	300	mW
Junction temperature	T_j	125	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55~125	$^\circ\text{C}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm

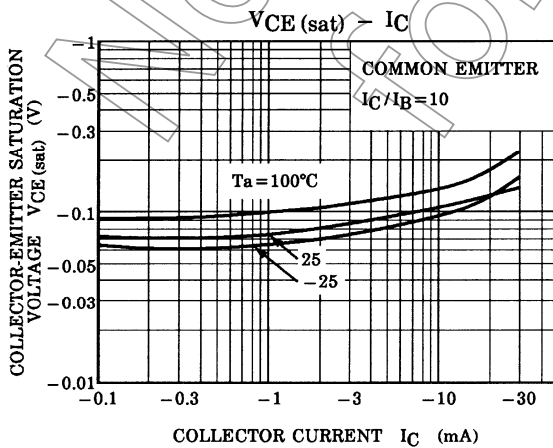
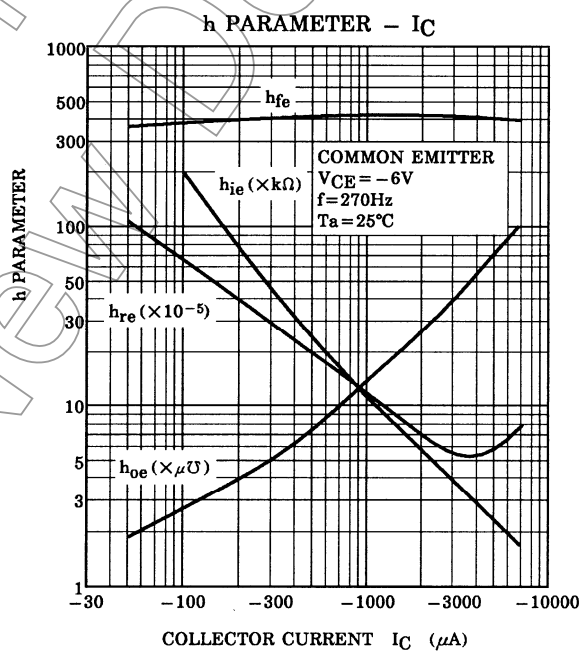
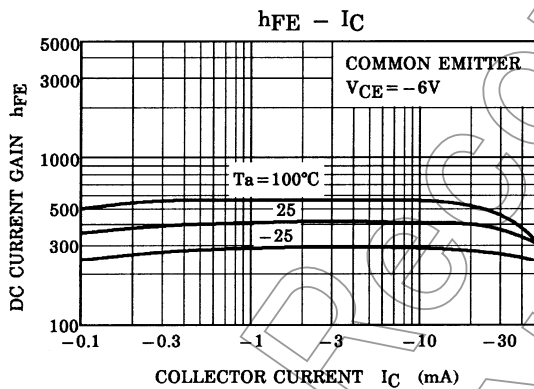
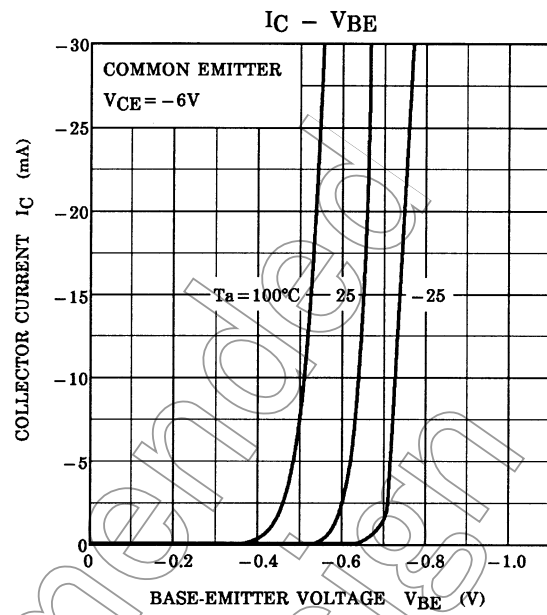
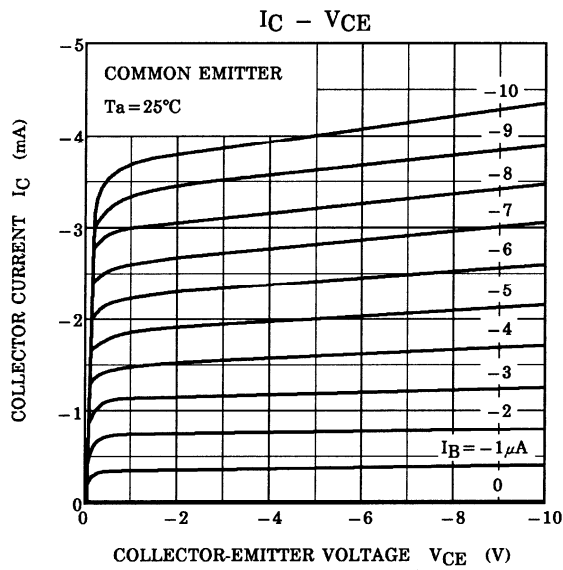
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TOSHIBA	2-5F1B

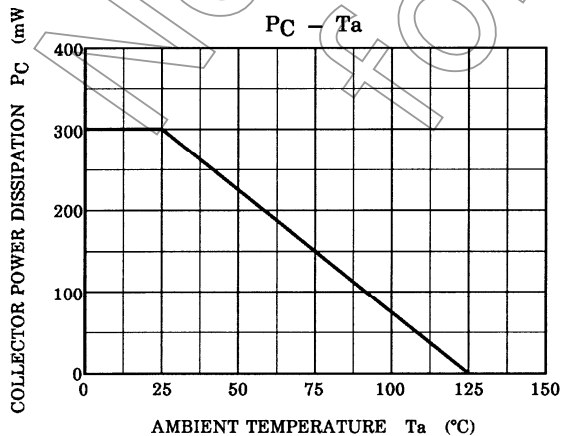
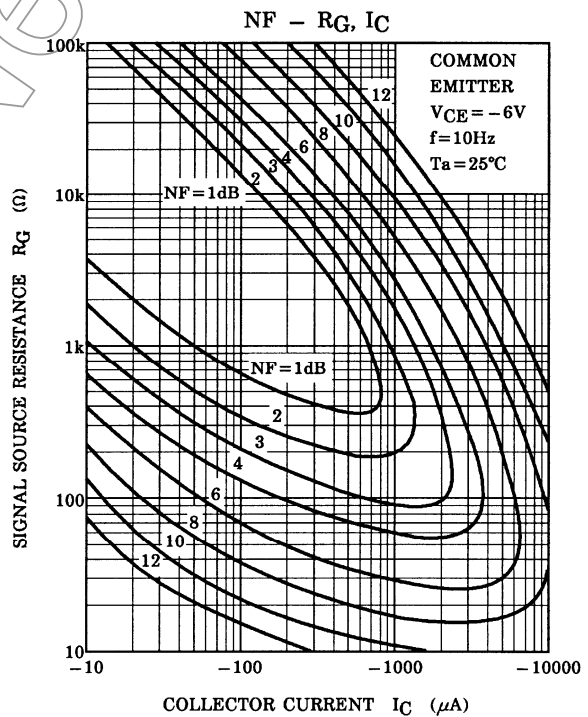
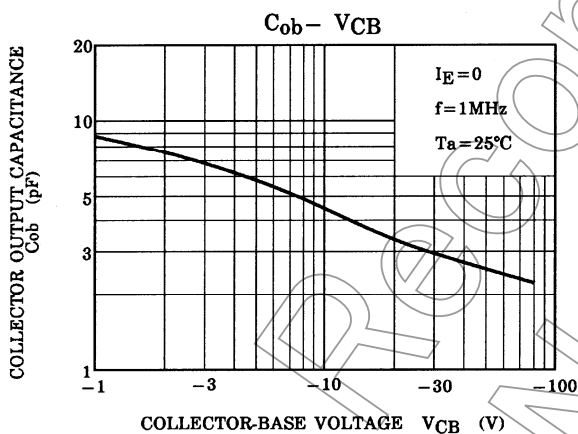
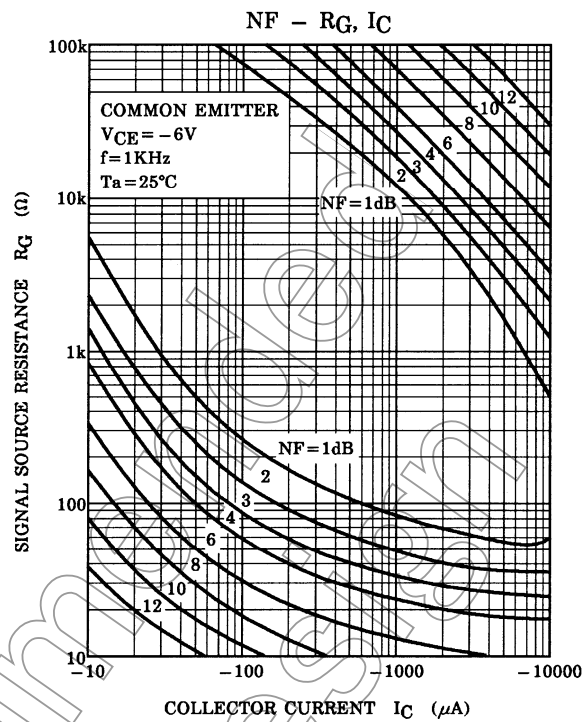
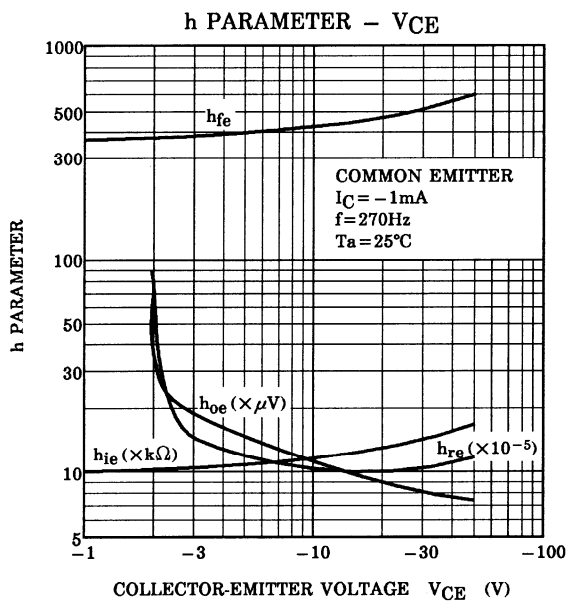
Weight: 0.21 g (typ.)

Electrical Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = -120\text{ V}$, $I_E = 0$	—	—	-0.1	μA
Emitter cut-off current	I_{EBO}	$V_{EB} = -5\text{ V}$, $I_C = 0$	—	—	-0.1	μA
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -1\text{ mA}$, $I_B = 0$	-120	—	—	V
DC current gain	h_{FE} (Note)	$V_{CE} = -6\text{ V}$, $I_C = -2\text{ mA}$	200	—	700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -10\text{ mA}$, $I_B = -1\text{ mA}$	—	—	-0.3	V
Base-emitter voltage	V_{BE}	$V_{CE} = -6\text{ V}$, $I_C = -2\text{ mA}$	—	-0.65	—	V
Transition frequency	f_T	$V_{CE} = -6\text{ V}$, $I_C = -1\text{ mA}$	—	100	—	MHz
Collector output capacitance	C_{ob}	$V_{CB} = -10\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$	—	4.0	—	pF
Noise figure	NF	$V_{CE} = -6\text{ V}$, $I_C = -0.1\text{ mA}$, $f = 10\text{ Hz}$, $R_G = 10\text{ k}\Omega$	—	—	6	dB
		$V_{CE} = -6\text{ V}$, $I_C = -0.1\text{ mA}$, $f = 1\text{ kHz}$, $R_G = 10\text{ k}\Omega$	—	—	2	
		$V_{CE} = -6\text{ V}$, $I_C = -0.1\text{ mA}$, $f = 1\text{ kHz}$, $R_G = 100\ \Omega$	—	3	—	

Note: h_{FE} classification GR: 200~400, BL: 350~700





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